POLLEN MORPHOLOGY IN NINE SPECIES OF JUTE (CORCHORUS)

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A comparative study of pollen morphology (shape, size, colpi length, colpi margin, pore character, exine surface and cellular features) of two cultivated (Corchorus olitorius L. and C. capsularis L.) and seven wild (C. fascicularis Lam., C. aestuans L., C. pseudoolitorius Islam and Zaid., C. pseudocapsularis L., C. tridens L., C. trilocularis L. and C. urticaefolius Lam.) species of jute (Family: Tiliaceae) have been made based on acetolysis technique and SEM analysis. Pollens in the species were subprolate (exception: C. pseudocapsularis – prolate); tricolporate(excepting C. trilocularis had both tricolporate – 90.0% and tetracolporate – 10.0% pollen grains), colpi margin normal or incurred, size of colpi medium to relatively longer and varied from 29.98μm ± 0.64 to 36.72μm ± 0.92; pore lalongate with edges raised or inconspicuous; exine surface reticulate, reticulation indistinct or distinct, tri-to penta-gonal or variously gonals, shallow to alveolate or pitted, sometimes angular with raised irregularly walls, junction knobbed or unknobbed. Pollen size is variable among the species (evidenced from x² – test of heterogeneity; p<0.01 for polar axis and p<0.001 for equatorial diameter) and it ranges from 38.30μm ± 0.54 x 30.45μm ± 0.54(C. capsularis) to 31.17μm ± 0.64 x 24.2μm ± 0.55(C. trilocularis). A key to the identification of the species has been prepared and presented.

Keywords: Corchorus; Key; Pollen morphology; SEM.

Introduction
Pollen grains have selective advantages as it can be stored in a viable condition for a considerable length of time for use throughout the year and therefore, become favorite system for studying range of biological problems in both fundamental and applied areas¹. Pollen detailing in terms of its morphological variation has been considered to be an useful approach to delineate taxonomic relationship among plant taxa at different level²³. The present investigation documents a comparative study of pollen morphology (shape, size, colpi length, colpi margin, pore character, exine surface and cellular features) of two cultivated (Corchorus olitorius L. and C. capsularis L.) and seven wild (C. fascicularis Lam., C. aestuans L., C. pseudoolitorius Islam and Zaid., C. pseudocapsularis L., C. tridens L., C. trilocularis L. and C. urticaefolius Lam.) species of jute (Family: Tiliaceae) based on acetolysis technique and SEM analysis with the view to characterize the species aiding to the breeding behaviour of the crop.

Material and Methods
Pollens from 9 species of Jute (C. olitorius L. - JRO-524, C. capsularis L.-JRC-321, C. fascicularis Lam.-WCJJ-150, C. aestuans L.-WCJJ-088, C. pseudoolitorius Islam and Zaid.-OIN-507, C. pseudocapsularis L.-CIM-036, C. tridens L.-WCJJ-149, C. trilocularis L.-KBA-222 and C. urticaefolius Lam.-WCJJ-070, obtained following the courtesy of Dr. Mohit Sinha, CRJJAF, Nilgunj, West Bengal), were collected from fully opened flowers and acetolysis method⁴ was adopted. The pollen grains were treated in a mixture of acetic anhydride and concentrated sulphuric acid (9:1) and the suspension was heated to boiling. The acetolysis mixture was removed and the pollen grains were rinsed, first in glacial acetic acid and then in water, and mounted in glycerin. They were examined under compound microscope (10x×40x) and their measurements were taken in micrometer.

For SEM study, the pollen grains of each species were put into 70% ethanol for 2 – 3 days in the eppendorf tubes and cleaned in an ultrasonic vibrator (Bran Sonic 221) for 4 – 10 min. Pollen grains of each species were fixed in glass plates and then mounted to specimen stubs with the double sided adhesive tape and silver painted. Pollen grains, mounted on the respective stubs, were placed on the revolving disc and coated with 200-300 Å thick gold in a vacuum evaporator of (Polaron) sputter coating system. The specimen stubs were then observed...
<table>
<thead>
<tr>
<th>Name of the species</th>
<th>Pollen shape</th>
<th>Pollen Size (µm)</th>
<th>Colpi length (µm)</th>
<th>Colpi margin</th>
<th>Pore character</th>
<th>Exine surface</th>
<th>Cellular features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Polar axis</td>
<td>Equatorial diameter</td>
<td></td>
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<tr>
<td><em>C. olitorius</em> (Figs.-1, 10)</td>
<td>Subprolate</td>
<td>35.61±1.12</td>
<td>29.53±0.82</td>
<td>33.82±0.72</td>
<td>Incurved</td>
<td>Raised edges</td>
<td>Reticulate</td>
</tr>
<tr>
<td><em>C. capsularis</em> (Figs.-2, 11)</td>
<td>Subprolate</td>
<td>38.30±0.54</td>
<td>30.45±0.54</td>
<td>34.10±0.73</td>
<td>Normal</td>
<td>Inconspicuous</td>
<td>Reticulate</td>
</tr>
<tr>
<td><em>C. fascicularis</em> (Figs.-3, 12)</td>
<td>Subprolate</td>
<td>34.83±0.64</td>
<td>27.13±0.53</td>
<td>33.83±0.55</td>
<td>Incurved</td>
<td>Inconspicuous</td>
<td>Reticulate</td>
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<tr>
<td><em>C. aestivalis</em> (Figs.-4, 13)</td>
<td>Subprolate</td>
<td>31.63±0.71</td>
<td>26.13±0.43</td>
<td>30.25±0.68</td>
<td>Incurved</td>
<td>Inconspicuous</td>
<td>Reticulate</td>
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<tr>
<td><em>C. pseudolitorius</em> (Figs.-5, 14)</td>
<td>Subprolate</td>
<td>36.12±0.80</td>
<td>29.70±0.55</td>
<td>33.00±0.29</td>
<td>Normal</td>
<td>Raised</td>
<td>Reticulate</td>
</tr>
<tr>
<td><em>C. pseudocapsularis</em> (Figs.-6, 15)</td>
<td>Prolate</td>
<td>36.30±0.37</td>
<td>23.65±0.36</td>
<td>36.03±0.49</td>
<td>Incurved</td>
<td>Inconspicuous</td>
<td>Reticulate</td>
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<tr>
<td><em>C. triden</em> (Figs.-7, 16)</td>
<td>Subprolate</td>
<td>37.22±1.04</td>
<td>31.17±0.58</td>
<td>36.72±0.92</td>
<td>Normal</td>
<td>Raised</td>
<td>Reticulate</td>
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<tr>
<td><em>C. trilocularis</em> (Figs.-8, 17)</td>
<td>Subprolate</td>
<td>31.17±0.64</td>
<td>24.20±0.55</td>
<td>29.98±0.64</td>
<td>Normal</td>
<td>Raised</td>
<td>Reticulate</td>
</tr>
<tr>
<td><em>C. urticaefolius</em> (Figs.-9, 18)</td>
<td>Subprolate</td>
<td>34.28±0.75</td>
<td>26.03±0.70</td>
<td>32.17±0.47</td>
<td>Normal</td>
<td>Raised edges</td>
<td>Reticulate</td>
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</table>

under SEM test (Model- JSM 5200 Tokyo, Japan) at 25 KV accelerating voltage at USIC, Jadavpur University, Kolkata. The samples were viewed and photomicrographs were taken at different magnifications.

Results and Discussion
Pollen morphology has been documented in Table 1 (Figs. 1-18). Pollens were tricolporate in the species with the exception of *C. trigonolobus* where tetracolporate (10.0%) pollen grains have also been noted (Fig. 8). Characteristic features in the species have been outlined and key to identification of the species has been presented below.

Key to species...

A. Pollen subprolate; colpi medium sized
B. Exine reticulation distinct
C. Exine walls variously angular-bounded with raised walls.
D. Reticulation of exine wall distinct with 3-5 gonial regions; wall raised and knobbed or rarely knobbed.
E. Reticulation with raised walls and knobbed.......................*C. olitorius*
F. Reticulation with raised walls, rarely knobbed.......................*C. urticaefolius*
G. Reticulation of exine walls variously gonial; walls raised but not knobbed.
F'. Pollen size 31.17 μm ± 0.64 x 24.20 μm ± 0.55; reticulation inconspicuous ..............*C. trigonolobus*
C'. Exine walls indistinct with shallow to pitted surface

G. Colpi of medium length (30.25 μm ± 0.68 to 33.83 μm ± 0.55); exine surface shallow to alveolate to pitted.

H. Reticulate region of exine surface with indistinct margin or border..................*C. fascicularis*
H'. Reticulate region of exine surface oblong in outline..................*C. aestuans*
G'. Colpi comparatively larger (36.72 μm ± 0.92); exine surface pitted.................*C. tridens*
B'. Exine reticulation not distinct, inconspicuous ..................*C. capsularis*
A'. Pollen prolate; colpi comparatively longer (36.03 μm ± 0.49)..........................*C. pseudoacapsularis*

Thus, identification of pollen characters through SEM and acetolysis techniques may be an additional constant to decipher interrelationship among *Corchorus* spp.

Acknowledgement
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References